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CONFERENCE SCHEDULING SYSTEM AND METHOD FOR IP NETWORK CONFERENCE TV

[IP WANGLUO HUIYI DIANSHI DE HUIYI DIAODU XITONG YU FANGFA]

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Claims

What is claimed is:

1. A conference scheduling system for IP network conference TV consisting of H.323 terminal for user to have meeting, MCU (Multiple Control Unit) for H.323 terminal control, primary GK for management of connected MCU and H.323 terminal, and top GK (GateKeeper) for management of connected primary GK, MCU and H.323 terminal, in that the equipments are all equipments specified in H.323 protocol, that each top GK is connected with primary GK and each primary GK is connected with MCU and H.323 terminal, that each top GK is also connected with MCU and H.323 terminal, that the protocols of communications between top GK and MCU, between primary GK and MCU, between top GK and H.323 terminal, between primary GK and H.323 terminal, between top GKs, between primary GKs, and between primary GK and top GK all adopt H.323 standard protocol for expansion.

2. The conference scheduling system for IP network conference TV in Claim 1, in that top GKs and primary GKs under the same top GK are interconnected directly.

3. The conference scheduling system for IP network conference TV in Claim 1 or Claim 2, in that account and

scheduling interfaces are further set up on each top GK and each primary GK.

4. A method for realizing conference appointment under the same primary GK using the said system in Claim 1, in that the method includes the following steps:

1a. A terminal requests for making a conference appointment and sends admission request signaling with account and password to a primary GK;

1b. The primary GK sends account request message according to user account and password to AAA server;

1c. AAA server authenticates the account and password and, if the conference is authorized, returns account response message;

1d. If the user is authorized to make a conference appointment, the primary GK returns with admission confirmation signaling, or otherwise returns with admission reject signaling;

1e. The terminal sends the primary GK admission request signaling with conference information;

1f. The primary GK extracts conference information from the admission request signaling and undertakes resource scheduling calculation. If the resource is sufficient, the primary GK reserves resource and returns with admission confirmation signaling to the terminal while

recording the resource allocation information of the reserved conference as well as conference start and finish time information. If the resource is insufficient, the primary GK returns with admission reject signaling;

1g. When the conference start time is up, the primary GK sends admission request signaling to MCU, sending the terminal location information involved in the conference to MCU and ordering MCU to start the conference;

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1h. Upon receiving the order from the primary GK, the MCU sends setup call signaling to the terminal based on terminal location information, establishes call with the terminal to enable the terminal to join the conference.

5. The method for realizing conference appointment under the same primary GK in Claim 4, in that the admission request signaling in steps (1a), (1e), (1f), and (1g) is: ARQ signaling; the admission confirmation signaling in steps (1d) and (1f) is: ACF signaling; the admission reject signaling in steps (1d) and (1f) is: ARJ signaling; the account request message in step (1b) is: Account Request message; the account response message in step (1c) is: Account Response message; the setup call signaling in step (1h) is: setup signaling.

6. A method for realizing conference end scheduling under the same primary GK using the said system in Claim 1, in that the method includes the following steps:

2a. A terminal requests for ending a conference and sends admission request signaling with account and password to a primary GK;

2b. The primary GK sends account request message according to user account and password to AAA server;

2c. AAA server authenticates the account and password and, if the conference end is authorized, returns account response message;

2d. If the user is authorized to end the conference, the primary GK returns with admission confirmation signaling;

2e. The terminal sends the primary GK admission request signaling with conference end information;

2f. The primary GK extracts conference end information from the admission request signaling and sends conference end admission request signaling to MCU;

2g. Upon receiving the conference end admission request signaling, the MCU sends disconnect signaling to all location terminals to make all terminals leave the conference. In the meantime, the MCU releases resources occupied by the conference;

2h. After the conference is ended, the MCU returns admission confirmation signaling to the primary GK;

2i. Upon receiving the conference end admission confirmation signaling, the primary GK releases conference information saved in the primary GK, and returns admission confirmation signaling to the terminal to make the terminal leave the conference.

7. The method for realizing conference end under the same primary GK in Claim 6, in that the admission request signaling in steps (2a), (2e), and (2f) is: ARQ signaling; the admission confirmation signaling in steps (2d), (2g), (2h) and (2i) is: ACF signaling; the disconnect signaling in step (2g) is: Disconnect signaling; the account request message in step (2b) is: Account Request message; the account response message in step (2c) is: Account Response message.

8. A method for realizing conference appointment scheduling between different GKs under the same top GK using the said system in Claim 1, in that the method includes the following steps:

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3a. The first terminal requests for making a conference appointment and sends admission request signaling with account and password to the first primary GK;

3b. The first primary GK sends account request message according to user account and password to AAA server;

3c. AAA server authenticates the account and password and, if the conference is authorized, returns account response message;

3d. If the user is authorized to make a conference appointment, the first primary GK returns with admission confirmation signaling, or otherwise returns with admission reject signaling;

3e. The first terminal sends the first primary GK admission request signaling with conference information;

3f. The first primary GK extracts conference information from the admission request signaling, undertakes analysis to conference information and, if it is discovered that the conference involves in other locations managed by the second primary GK, sends location request signaling with location resource request information to the second primary GK;

3g. Upon receiving the location request signaling with location resource request information, the second primary GK determines whether or not the location is available according to the use status of location resource and reserves the location and returns location confirmation signaling to the first primary GK if the location is

determined to be available, or returns location rejection signaling to the first primary GK if the location resource is unavailable;

3h. In addition to allocating resources under its own management, the first primary GK also records conference resource information and conference start and end time after it receives location confirmation signaling and after all location resources are allocated successfully, and then returns admission confirmation signaling to the first terminal, indicating the success of conference appointment. If the first primary GK discovers that its own resource is insufficient or if it receives location rejection signaling, it then returns admission reject signaling to the first terminal, indicating the failure of conference appointment;

3i. When the conference start time is up, the first primary GK sends admission request signaling to MCU, sending the terminal location information involved in the conference to MCU and ordering MCU to start the conference;

3j. Upon receiving the admission request signaling, the MCU sends setup call signaling to the first terminal based on terminal location information, and then continues the follow-up Q.931, H.245, RTP protocol processing to enable the first terminal to join the conference;

3k. The MCU sends setup call signaling to the second primary GK if the conference information received also contains conference resource of the second primary GK. The second primary GK forwards the setup call signaling to the second terminal and then continues the follow-up Q.931, H.245, RTP protocol processing to enable the second terminal to join the conference.

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9. A method for realizing conference end scheduling between different GKs under the same top GK in Claim 8, in that the admission request signaling in steps (3a), (3e), (3f), (3i) and (3j) is: ARQ signaling; the admission confirmation signaling in steps (3d) and (3h) is: ACF signaling; the admission reject signaling in steps (3d) and (3h) is: ARJ signaling; the setup call signaling in steps (3j) and (3k) is: setup signaling; the location request signaling in steps (3f) and (3g) is LRQ signaling; the location confirmation signaling in steps (3g) and (3h) is: LCF signaling; the location rejection signaling in steps (3g) and (3h) is: LRJ signaling; the account request message in step (3b) is: Account Request message; and the account response message in step (3c) is: Account Response message.

10. A method for realizing conference scheduling between different top GKs using the said system in Claim 1, in that the method includes the following steps:

4a. The first terminal requests for making a conference appointment and sends admission request signaling with account and password to the first primary GK;

4b. The first primary GK sends account request message according to user account and password to AAA server;

4c. AAA server authenticates the account and password and, if the conference is authorized, returns account response message;

4d. If the user is authorized to make a conference appointment, the first primary GK returns with admission confirmation signaling, or otherwise returns with admission reject signaling;

4e. The first terminal sends the first primary GK admission request signaling with conference information;

4f. The first primary GK extracts conference information from the admission request signaling, undertakes analysis to conference information. If it is discovered that the second terminal involved in the conference is not managed by the first primary GK and that the first primary GK does not know which GK is in charge of the management of the location, the first primary GK then

sends location request signaling with location resource request information to its own first top GK;

4g. Upon receiving the location request signaling with location resource request information and discovering that the location resource is under management of the second top GK, the first top GK then forwards the location request signaling with location resource request information to the second top GK;

4h. Upon receiving the location request signaling with location resource request information, the second top GK analyzes location resource information and forwards the location request signaling to the second primary GK if it determines that the location resource is managed by the second primary GK;

4i. Upon receiving the location request signaling with location resource request, the second primary GK determines whether or not the location is available according to the use status of location resource and reserves the location and returns location confirmation signaling to the second top GK if the location is determined to be available, or returns location rejection signaling to the second top GK if the location resource is unavailable;

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4j. The second top GK forwards the location confirmation signaling or location rejection signaling returned from the second primary GK to the first top GK;

4k. The first top GK forwards the location confirmation signaling or location rejection signaling returned from the second top GK to the first primary GK;

4l. In addition to allocating resources under its own management, the first primary GK also records conference resource information and conference start and end time after it receives location confirmation signaling and after all location resources are allocated successfully, and then returns admission confirmation signaling to the first terminal, indicating the success of conference appointment. If the first primary GK discovers that its own resource is insufficient or if it receives location rejection signaling, it then returns admission reject signaling to the first terminal, indicating the failure of conference appointment;

4m. When the conference start time is up, the first primary GK sends admission request signaling to MCU, sending the terminal location information involved in the conference to MCU and ordering MCU to start the conference;

(4n) Upon receiving the admission request signaling, the MCU sends setup call signaling to the first terminal based on terminal location information, and then continues

the follow-up Q.931, H.245, RTP protocol processing to enable the first terminal to join the conference;

(4o) The MCU sends setup call signaling to the first top GK if the conference information received also contains conference resource of the second primary GK.

(4p) The first top GK forwards the setup call signaling to the second top GK;

(4q) The second top GK re-forwards the signaling to the second primary GK;

(4r) The second primary GK re-forwards the signaling to the second terminal, and continues the follow-up Q.931, H.245, RTP protocol processing to enable the second terminal to join the conference.

11. The method for realizing conference end scheduling between different top GKs in Claim 10, in that the admission request signaling in steps (4a), (4e), (4m), and (4n) is: ARQ signaling; the admission confirmation signaling in steps (4d) and (4l) is: ACF signaling; the admission reject signaling in steps (4d) and (4l) is: ARJ signaling; the setup call signaling in steps (4n), (4o) and (4p) is: setup signaling; the location request signaling in steps (4f), (4g), (4h), and (4i) is LRQ signaling; the location confirmation signaling in steps (4i), (4j), (4k), and (4l) is: LCF signaling; the location rejection

signaling in steps (4i), (4j), and (4k) is: LRJ signaling; the account request message in step (4b) is: Account Request message; and the account response message in step (4c) is: Account Response message.

12. A method for one terminal to invite another terminal to join conference using the said system in Claim 1, in that the method includes the following steps:

5a. The first terminal sends admission request signaling with account and password to the first primary GK in order to invite the second terminal to join the conference;

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5b. Upon receiving the admission request signaling, the first primary GK sends account request message containing account and password information to AAA server;

5c. AAA server authenticates the account and password and, if the first terminal is authorized to invite the second terminal to join the conference, returns account response message;

5d. The first primary GK returns admission confirmation signaling to the first terminal, authorizing the terminal to invite the second terminal to join the conference;

5e. The first terminal sends the first primary GK admission request signaling for inviting the second terminal to join the conference;

5f. Upon receiving the admission request signaling and discovering that the second terminal should join the MCU conference managed by the second primary GK, the first primary GK sends the second primary GK location request signaling with the second terminal information;

5g. The second primary GK sends admission request signaling containing the second terminal information to MCU when it discovers that the second terminal is available;

5h. Upon receiving the admission request signaling from the second primary GK, the MCU sends setup call signaling to the second terminal and then undertakes follow-up Q.931, H.245 and RTP protocol processing, inviting the second terminal to join the conference held on MCU;

5i. The second primary GK returns location confirmation signaling to the first primary GK;

5j. The first primary GK returns admission confirmation signaling to the first terminal, indicating that inviting the second terminal to the conference is successful.

13. The method for one terminal to invite another terminal to join conference in Claim 12, in that the admission request signaling in steps (5a), (5b), (5e), (5f), (5g) and (5h) is: ARQ signaling; the admission confirmation signaling in steps (5d) and (5j) is: ACF signaling; the setup call signaling in step (5h) is: setup signaling; the location request signaling in step (5f) is LRQ signaling; the location confirmation signaling in step (5i) is: LCF signaling; the account request message in step (5b) is: Account Request message; and the account response message in step (5c) is: Account Response message.

14. A method for one terminal to have another terminal in the conference leave the conference using the said system in Claim 1, in that the method includes the following steps:

6a. The first terminal sends admission request signaling with account and password to the first primary GK;

6b. The first primary GK sends account request message to AAA server;

6c. AAA server authenticates the account and password and, if the first terminal is authorized to have the second terminal leave the conference, returns account response message;

6d. The first primary GK returns admission confirmation signaling to the first terminal, authorizing the first terminal to have the second terminal leave the conference;

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6e. The first terminal sends the first primary GK admission request signaling containing the second terminal information, requesting to have the second terminal leave the conference;

6f. Upon discovering that the second terminal belongs to the conference held on MCU managed by the second primary GK, the first primary GK sends the second primary GK location request signaling containing the information of deleting the second terminal;

6g. The second primary GK sends the MCU admission request signaling having the second terminal leave the conference;

6h. MCU sends disconnect signaling to the terminal and then conducts the follow-up call end process to have the second terminal leave the conference;

6i. The second primary GK returns location confirmation signaling to the first primary GK;

6j. The first primary GK returns admission confirmation signaling to the first terminal, indicating

the success in having the second terminal leave the conference.

15. The method for one terminal to have another terminal in the conference leave the conference in Claim 14, in that the admission request signaling in steps (6a), (6e) and (6g) is: ARQ signaling; the admission confirmation signaling in steps (6d) and (6j) is: ACF signaling; the disconnect signaling in step (6h) is: disconnect signaling; the location request signaling in step (6f) is LRQ signaling; the location confirmation signaling in step (6i) is: LCF signaling; the account request message in step (6b) is: Account Request message; and the account response message in step (6c) is: Account Response message.

16. A method for realizing conference appointment scheduling through GK scheduling interface, in that the method includes the following steps:

7a. ICP requests for making a conference appointment and sends admission request signaling with account and password to a primary GK;

7b. The primary GK initiates account request message to AAA server according to user account and password;

7c. AAA server authenticates the account and password and, if the conference is authorized, returns account response message;

7d. The primary GK returns admission confirmation signaling if the ICP is authorized to make conference appointment, or otherwise returns admission reject signaling;

7e. The ICP sends admission request signaling containing conference information to the primary GK;

7f. The primary GK extracts conference information from the admission request signaling and conducts resource scheduling calculation. If the resource is sufficient, the primary GK reserves resource and returns with admission confirmation signaling to the terminal while recording the resource allocation information of the reserved conference as well as conference start and finish time information. If the resource is insufficient, the primary GK returns with admission reject signaling;

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7g. When the conference start time is up, the primary GK sends admission request signaling to MCU, sending the terminal location information involved in the conference to MCU and ordering MCU to start the conference;

7h. Upon receiving the order from the primary GK, the MCU sends setup call signaling to all conference terminals according to terminal location information, and establishes

call with the terminals to enable all terminals to join the conference.

17. The method for realizing conference appointment scheduling through GK scheduling interface in Claim 16, in that the admission request signaling in steps (7a), (7e), (7f), and (7g) is: ARQ signaling; the admission confirmation signaling in steps (7d) and (7f) is: ACF signaling; the admission reject signaling in steps (7d) and (7f) is: ARJ signaling; the setup call signaling in step (7h) is: setup signaling; the account request message in step (7b) is: Account Request message; and the account response message in step (7c) is: Account Response message.

Description

Conference Scheduling System and

Method for IP Network Conference TV

Technical Field:

The present invention relates to video conference, especially a multi-point scheduling and easy-to-expand conference scheduling system and method for IP network conference TV.

Background Technology:

With the advancement of network technology, there is a need for people to conduct face to face communication through network. As a result, the conference TV system with information exchange functions providing real time, fast, interactive images, voices and data is developed.

Today's IP network conference TV system is generally applied in specialty network and enterprises. There are two common networking methods: internal IP network conference TV system (see Figure 1) and external IP network conference TV system (see Figure 2). The two IP network conference TV systems with different networking methods are introduced below:

The difference of the two systems is that the conference scheduling unit of the internal IP network conference TV system is built inside while the conference scheduling unit of the external IP network conference TV system is built externally.

No matter whether the conference scheduling unit is built internally or externally, both the two kinds of IP network conference TV systems manage MCU (Multiple Control Unit) through internal private protocols, and apply a special conference scheduling unit to collectively manage multiple MCU for conference scheduling. The specific scheduling process is shown as follows:

A. The user first makes a conference appointment at the conference scheduling unit, defining the conference bandwidth, number of terminal locations in the conference, as well as conference start time and end time;

B. The user then executes conference scheduling operation at the conference scheduling unit. The conference scheduling unit determines if the resource is sufficient according to MCU, GK (gatekeeper) and terminal use status. If the resource is sufficient, the conference appointment is successful. Otherwise, the conference

appointment is unsuccessful. Once the appointment is made successfully, the conference scheduling unit records the appointed conference information;

C. When the conference start time is up, the conference scheduling unit automatically issues conference information to MCU and GK. Then, MCU calls terminals to have the terminals join the conference on MCU;

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D. During the conference, the conference scheduling unit may issue order to MCU to add or delete location, switch location image etc.;

E. When the conference end time is up, the conference scheduling unit issues order to end the conference. In the meantime, the MCU and GK release the resources occupied by the conference.

However, as both the two networking methods manage MCU through internal private protocols and both conduct conference scheduling by adopting a special-purpose conference scheduling unit to collectively manage multiple MCU, the two systems have the following common disadvantages:

1. The communication protocol between the conference scheduling unit and the equipment specified in ITU-T.H.323 protocol is not in line with H.323 protocol;
2. The performance and safety demand to conference scheduling unit is high when all resources are managed by one conference scheduling unit;
3. The expandability and interconnectivity are less desirable, making intercommunication between TV devices from different manufacturers very difficult;
4. The systems are merely applicable to specialty and internal networks, and are unable to realize trans-regional, graded, and international public IP conference TV service.

Disclosure of Invention:

The purpose of the present invention is to provide a conference scheduling system and method for IP network conference TV in which both the conference scheduling unit and the equipment specified in ITU-T.H.323 protocol are in line with standard H.323 protocol.

Another purpose of the present invention is to provide a conference scheduling system and method for IP network conference TV that have good expandability and interconnectivity, and can realize mutual communications between conference TV equipment of different manufacturers.

Another purpose of the present invention is to provide a conference scheduling system and method for IP network conference TV that are applicable to specialty networks, can realize trans-regional, graded, and international public IP conference TV service, and are less demanding on the performance and safety requirements of conference TV scheduling equipment.

To achieve the above objective, the following technical solution is applied in the present invention:

The IP conference TV system of the present invention includes top GK (gatekeeper), primary GK, MCU (Multiple Control Unit), and H.323 terminals. These equipments are all specified in H.323 protocol. The communication protocols between GK and MCU, between GK and H.323 terminals, between same level GKs, and between primary GK and top GK all adopt H.323 standard protocol for extension. The network structure of the IP conference TV system of the present invention is graded network management structure, in which both MCU and H.323 terminals are managed by top GK or primary GK so that the conference resource of the whole network can be utilized independently according to GK level, or can be shared, thus greatly enhancing the expandability and interconnectivity of the system as a whole. Besides, each GK also has an authentication and scheduling interface

to ensure that the IP network conference TV system of the present invention can conveniently connect to AAA (Authentication, Authorization, and Accounting), ICP, and IP intelligent network via standard interface in order to meet the need of public IP conference TV operation.

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Because of the above technical solution, the present invention offers the following advantages:

1. Instead of using special conference scheduling equipment managed through internal, private protocol in traditional system, the present invention uses GK as conference scheduling unit. In addition, extended H.323 protocol is applied for communications between GK and H.323 terminal in the present invention. Therefore, when the user undertakes conference TV activities such as account verification, conference appointment, and conference call, the GK in the system can reserve, assign and schedule MCU or H.323 terminals under its management according to resources needed by the conference.
2. Since extended H.323 is applied for communications between GK and MCU, GK can manage MCU conference resource, analyze and find out MCU resource use

status in a certain time range, and issue order information relating to the conference to MCU to further realize user functions such as starting conference, ending conference, joining conference, and leaving conference.

3. Since extended H.323 protocol is applied for GK-GK communications, it is easy to realize trans-GK regional conference scheduling function.
4. The two-level GK structure network can help realize the function of sharing and scheduling of conference resources between different operators.
5. As certification interface is provided in each every GK, the user account verification and authorization function can be realized easily.
6. The scheduling interface provided on each GK can help realize communications between the IP network conference TV system and Internet WEB Server, ICP (Internet Content Provider), and IP intelligent network to meet the need for business operations.

Figures

Figure 1 shows a traditional internal IP network conference TV system;

Figure 2 shows a traditional external IP network conference TV system;

Figure 3 shows IP conference TV system networking structure of the present invention;

Figure 4 shows flowchart of conference appointment and scheduling method under same level GK in the IP conference TV system of the present invention;

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Figure 5 shows flowchart of conference end scheduling method under the same level GK in the IP conference TV system of the present invention;

Figure 6 shows flowchart of conference appointment scheduling method between different GKs under the same top GK in the IP conference TV system of the present invention;

Figure 7 shows flowchart of conference appointment scheduling method between different top GKs in the IP conference TV system of the present invention;

Figure 8 shows flowchart for one terminal to invite another terminal to join conference in the IP conference TV system of the present invention;

Figure 9 shows flowchart for one terminal to have another terminal in the conference leave the conference in the IP conference TV system of the present invention;

Figure 10 shows flowchart of conference appointment scheduling method through GK scheduling interface in the IP conference TV system of the present invention.

Implementations

As shown in Figure 3, the IP conference TV system of the present invention includes top GK (gatekeeper), primary GK, MCU (Multiple Control Unit), and H.323 terminals. These equipments are all specified in H.323 protocol. The communication protocols between GK and MCU, between GK and H.323 terminals, between same level GKs, and between primary GK and top GK all adopt H.323 standard protocol for extension. The network structure of the IP conference TV system of the present invention is graded network management structure, in which both MCU and H.323 terminals are managed by top GK or primary GK so that the conference resource of the whole network can be utilized independently according to GK level, or can be shared, thus greatly enhancing the expandability and interconnectivity of the system as a whole. Besides, each GK also has an authentication and scheduling interface to ensure that the IP network conference TV system of the present invention can conveniently connect to AAA (Authentication, Authorization, and Accounting), ICP, and IP intelligent network via standard interface.

In order for GK to realize conference resource scheduling, ITU-T H.225 RAS protocol is extended based on H.323 standard protocol in the present invention. Because

the protocol is extended on the basis of H.323 protocol and the extension is in line with the extension fields specified in H.323 protocol, the extended protocol does not affect the processing of the former standard protocol. The extended protocols of the present invention include:

(1) ARQ/ACF/ARJ: which is applicable to communications between GK and H.323 terminal, and between GK and MCU (ARQ: Admission Request; ACF: Admission Confirm; ARJ: Admission Reject);

(2) LRQ/LCF/LRJ: which is applicable to communications between primary GKs, between primary GK and top GK, and between GK and WEB Server, ICP, or IP intelligent network (LRQ: Location Request; LCF: Location Confirm; LRJ: Location Reject).

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Furthermore, H.225 ANNEX G protocol can be applied for extension for communications between primary GK and top GK and between primary GKs. The protocol between GK and AAA server is standard Radius protocol (RFC2685, RFC2687). Since the above extension and protocols are techniques known to public, they are not discussed here in detail.

Several processing methods for scheduling and controlling IP conference resources in the IP conference TV

system of the present invention are described in detail with the assistance of Figure 4 through Figure 10:

Method 1: Method for realizing conference appointment under the same primary GK

As shown in Figure 4, the method for realizing conference appointment under the same primary GK includes the following steps:

1a. Terminal 1 requests for making a conference appointment and sends ARQ signaling with account and password to primary GK 1;

1b. The primary GK 1 sends Account Request message according to user account and password to AAA server;

1c. The AAA server authenticates the account and password and, if the conference is authorized, returns Account Response message;

1d. If the user is authorized to make a conference appointment, the primary GK 1 returns with ACF signaling, or otherwise returns with ARJ signaling;

1e. The terminal 1 sends the primary GK 1 ARQ signaling with conference information;

1f. The primary GK 1 extracts conference information from ARQ signaling and undertakes resource scheduling calculation. If the resource is sufficient, the primary GK 1 reserves resource and returns with ACF signaling to

terminal 1 while recording the resource allocation information of the reserved conference as well as conference start and finish time information. If the resource is insufficient, the primary GK 1 returns with ARJ signaling;

1g. When the conference start time is up, the primary GK 1 sends ARQ signaling to MCU, sending the terminal location information involved in the conference to MCU and ordering MCU to start the conference;

1h. Upon receiving the order from the primary GK 1, the MCU sends Setup call signaling to terminal 1 based on terminal location information, establishes call with terminal 1 to enable terminal 1 to join the conference.

MCU follows the same procedure to call all other terminal in the conference to accomplish the conference startup process.

Method 2: Method for realizing conference end scheduling under the same primary GK

As shown in Figure 5, the method for realizing conference end scheduling under the same primary GK includes the following steps:

2a. Terminal 1 requests for ending a conference and sends ARQ signaling with account and password to primary GK 1;

2b. The primary GK 1 sends Account Request message according to user account and password to AAA server;

2c. AAA server authenticates the account and password and, if the conference end is authorized, returns Account Response message;

2d. If the user is authorized to end the conference, the primary GK 1 returns with ACF signaling;

2e. Terminal 1 sends the primary GK 1 ARQ signaling with conference end information;

2f. The primary GK 1 extracts conference end information from ARQ signaling and sends conference end ARQ signaling to MCU;

2g. Upon receiving the conference end admission request signaling, the MCU sends disconnect signaling to all location terminals to make all terminals leave the conference. In the meantime, the MCU releases resources occupied by the conference;

2h. After the conference is ended, the MCU returns ACF signaling to the primary GK 1;

2i. Upon receiving the conference end ACF signaling, the primary GK 1 releases conference information saved in the primary GK 1, and returns ACF signaling to terminal 1 to make terminal 1 leave the conference.

Method 3: Method for realizing conference appointment scheduling between different GKs under the same top GK

As shown in Figure 6, the method for realizing conference appointment scheduling between different GKs under the same top GK, or between primary GK and top GK includes the following steps:

3a. Terminal 1 requests for making a conference appointment and sends ARQ signaling with account and password to the primary GK 1;

3b. The primary GK 1 sends Account Request message according to user account and password to AAA server;

3c. AAA server authenticates the account and password and, if the conference is authorized, returns Account Response message;

3d. If the user is authorized to make a conference appointment, the primary GK 1 returns with ACF signaling, or otherwise returns with ARJ signaling;

3e. Terminal 1 sends the primary GK 1 ARQ signaling with conference information;

3f. The primary GK 1 extracts conference information from the ARQ signaling, undertakes analysis to conference information and, if it is discovered that the conference involves in other locations managed by the primary GK 2,

sends LRQ signaling with location resource request information to the primary GK 2;

3g. Upon receiving the location request signaling with location resource request information, the primary GK 2 determines whether or not the location is available according to the use status of location resource and reserves the location and returns LCF signaling to the primary GK 1 if the location is determined to be available, or returns LRJ signaling to the primary GK 1 if the location resource is unavailable;

3h. In addition to allocating resources under its own management, the primary GK 1 also records conference resource information and conference start and end time after it receives LCF signaling and after all location resources are allocated successfully, and then returns ACF signaling to Terminal 1, indicating the success of conference appointment. If the primary GK 1 discovers that its own resource is insufficient or if it receives LRJ signaling, it then returns ARJ signaling to Terminal 1, indicating the failure of conference appointment;

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3i. When the conference start time is up, the primary GK 1 sends ARQ signaling to MCU, sending the terminal

location information involved in the conference to MCU and ordering MCU to start the conference;

3j. Upon receiving the ARQ signaling, the MCU sends Setup call signaling to Terminal 1 based on terminal location information, and then continues the follow-up Q.931, H.245, RTP protocol processing to enable Terminal 1 to join the conference;

3k. The MCU sends Setup call signaling to the primary GK 2 if the conference information received also contains conference resource of the primary GK 2. The primary GK 2 forwards the Setup call signaling to Terminal 2 and then continues the follow-up Q.931, H.245, RTP protocol processing to enable Terminal 2 to join the conference.

Method 4: Method for realizing conference scheduling between different top GKs

As shown in Figure 7, the method for realizing conference scheduling between different top GKs includes the following steps. The GKs involved in the scheduling are primary GK 1, top GK 1, primary GK 2, and top GK 2:

4a. Terminal 1 requests for making a conference appointment and sends ARQ signaling with account and password to primary GK 1;

4b. The primary GK 1 sends Account Request message according to user account and password to AAA server;

4c. AAA server authenticates the account and password and, if the conference is authorized, returns Account Response message;

4d. If the user is authorized to make a conference appointment, the primary GK 1 returns with ACF signaling, or otherwise returns with ARJ signaling;

4e. Terminal 1 sends the primary GK 1 ARQ signaling with conference information;

4f. The primary GK 1 extracts conference information from the ARQ signaling, undertakes analysis to conference information. If it is discovered that terminal 2 involved in the conference is not managed by primary GK 1 and that primary GK 1 does not know which GK is in charge of the management of the location, primary GK 1 then sends LRQ signaling with location resource request information to its own top GK 1;

4g. Upon receiving the LRQ signaling with location resource request information and discovering that the location resource is under management of top GK 2, top GK 1 then forwards the LRQ signaling with location resource request information to top GK 2;

4h. Upon receiving the LRQ signaling with location resource request information, top GK 2 analyzes location resource information and forwards the LRQ signaling to

primary GK 2 if it determines that the location resource is managed by primary GK 2;

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4i. Upon receiving the LRQ signaling with location resource request, the primary GK 2 determines whether or not the location is available according to the use status of location resource and reserves the location and returns LCF signaling to top GK 2 if the location is determined to be available, or returns LRJ signaling to top GK 2 if the location resource is unavailable;

4j. Top GK 2 forwards the LCF signaling or LRJ signaling returned from primary GK 2 to the top GK 1;

4k. Top GK 1 forwards the LCF signaling or LRJ signaling returned from top GK 2 to primary GK 1;

4l. In addition to allocating resources under its own management, primary GK 1 also records conference resource information and conference start and end time after it receives LCF signaling and after all location resources are allocated successfully, and then returns ACF signaling to terminal 1, indicating the success of conference appointment. If primary GK 1 discovers that its own resource is insufficient or if it receives LRJ signaling, it then returns ARJ signaling to terminal 1, indicating the failure of conference appointment;

4m. When the conference start time is up, primary GK 1 sends ARQ signaling to MCU, sending the terminal location information involved in the conference to MCU and ordering MCU to start the conference;

(4n) Upon receiving the ARQ signaling, the MCU sends Setup call signaling to terminal 1 based on terminal location information, and then continues the follow-up Q.931, H.245, RTP protocol processing to enable terminal 1 to join the conference;

(4o) The MCU sends Setup call signaling to top GK 1 if the conference information received also contains conference resource of primary GK 2.

(4p) Top GK 1 forwards the Setup call signaling to top GK 2;

(4q) Top GK 2 re-forwards the signaling to primary GK 2;

(4r) Primary GK 2 re-forwards the signaling to terminal 2, and continues the follow-up Q.931, H.245, RTP protocol processing to enable terminal 2 to join the conference.

Method 5: Method for one terminal to invite another terminal to join conference

As shown in Figure 8, the method for one terminal to invite another terminal to join conference includes the following steps:

5a. Terminal 1 sends ARQ signaling with account and password to primary GK 1 in order to invite terminal 2 to join the conference;

5b. Upon receiving the ARQ signaling, primary GK 1 sends Account Request message containing account and password information to AAA server;

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5c. AAA server authenticates the account and password and, if terminal 1 is authorized to invite terminal 2 to join the conference, returns Account Response message;

5d. Primary GK 1 returns ACF signaling to terminal 1, authorizing the terminal to invite terminal 2 to join the conference;

5e. Terminal 1 sends primary GK 1 ARQ signaling for inviting terminal 2 to join the conference;

5f. Upon receiving the ARQ signaling and discovering that terminal 2 should join the MCU conference managed by primary GK 2, primary GK 1 sends the primary GK 2 LRQ signaling with terminal 2 information;

5g. Primary GK 2 sends ARQ signaling containing terminal 2 information to MCU when it discovers that terminal 2 is available;

5h. Upon receiving the ARQ signaling from primary GK 2, the MCU sends Setup call signaling to terminal 2 and then undertakes follow-up Q.931, H.245 and RTP protocol processing, inviting terminal 2 to join the conference held on MCU;

5i. Primary GK 2 returns LCF signaling to primary GK 1;

5j. Primary GK 1 returns ACF signaling to terminal 1, indicating that inviting terminal 2 to the conference is successful.

Method 6: Method for one terminal to have another terminal in the conference leave the conference

As shown in Figure 9, the method for one terminal to have another terminal in the conference leave the conference includes the following steps:

6a. Terminal 1 sends ARQ signaling with account and password to primary GK 1;

6b. Primary GK 1 sends Account Request message to AAA server;

6c. AAA server authenticates the account and password and, if the first terminal is authorized to have the second

terminal leave the conference, returns Account Response message;

6d. Primary GK 1 returns ACF signaling to terminal 1, authorizing terminal 1 to have terminal 2 leave the conference;

6e. Terminal 1 sends primary GK 1 ARQ signaling containing terminal 2 information, requesting to have terminal 2 leave the conference;

6f. Upon discovering that terminal 2 belongs to the conference held on MCU managed by primary GK 2, primary GK 1 sends primary GK 2 LRQ signaling containing the information of deleting terminal 2;

6g. Primary GK 2 sends the MCU ARQ signaling having terminal 2 leave the conference;

6h. MCU sends Disconnect signaling to the terminal and then conducts the follow-up call end process to have terminal 2 leave the conference;

6i. Primary GK 2 returns LCF signaling to primary GK 1;

6j. Primary GK 1 returns ACF signaling to terminal 1, indicating the success in having terminal 2 leave the conference.

Method 7: Method for realizing conference appointment scheduling through GK scheduling interface

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Figure 10 shows the method for realizing conference appointment scheduling through GK scheduling interface. In the system of the present invention, a scheduling interface is provided on each GK. Conference appointment can be made through GK scheduling interface, WEB Server, ICP, or IP intelligent network.

The method for realizing conference appointment scheduling through GK scheduling interface includes the following steps:

7a. ICP requests for making a conference appointment and sends ARQ signaling with account and password to primary GK 1;

7b. Primary GK 1 initiates Account Request message to AAA server according to user account and password;

7c. AAA server authenticates the account and password and, if the conference is authorized, returns Account Response message;

7d. Primary GK 1 returns ACF signaling if the ICP is authorized to make conference appointment, or otherwise returns ARJ signaling;

7e. The ICP sends ARQ signaling containing conference information to primary GK 1;

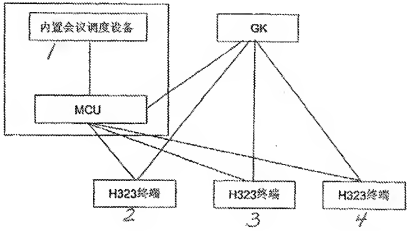
7f. Primary GK 1 extracts conference information from the ARQ signaling and conducts resource scheduling

calculation. If the resource is sufficient, primary GK 1 reserves resource and returns with ACF signaling to the terminal while recording the resource allocation information of the reserved conference as well as conference start and end time information. If the resource is insufficient, primary GK 1 returns with ARJ signaling;

7g. When the conference start time is up, primary GK 1 sends ARQ signaling to MCU, sending the terminal location information involved in the conference to MCU and ordering MCU to start the conference;

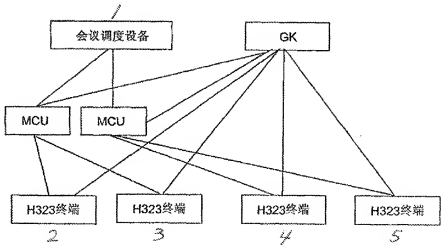
7h. Upon receiving the order from primary GK 1, the MCU sends Setup call signaling to all conference terminals according to terminal location information, and establishes call with the terminals to enable all terminals to join the conference.

Drawings



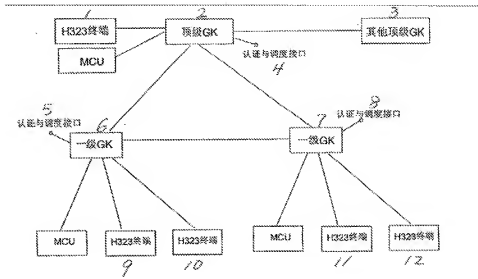
1—Internal conference scheduling unit; 2—H323 terminal; 3—H323 terminal; 4—H323 terminal

Figure 1



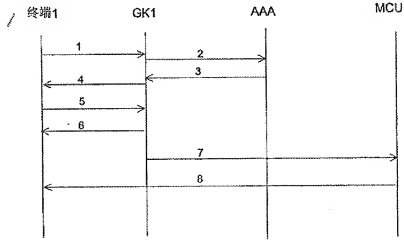
1—Conference scheduling unit; 2—H323 terminal; 3—H323 terminal; 4—H323 terminal; 5—H323 terminal

Figure 2



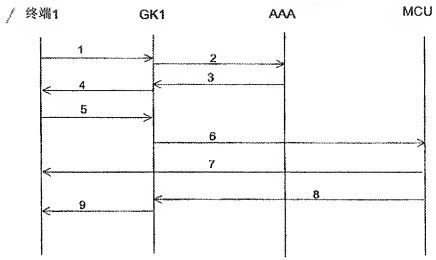
1—H323 terminal; 2—Top GK; 3—Other top GK; 4—Authentication and scheduling interface; 5—Authentication and scheduling interface; 6—Primary GK; 7—Primary GK; 8—Authentication and scheduling interface; 9—H323 terminal; 10—H323 terminal; 11—H323 terminal; 12—H323 terminal

Figure 3



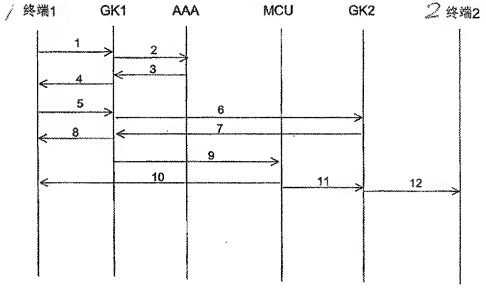
1—Terminal 1

Figure 4



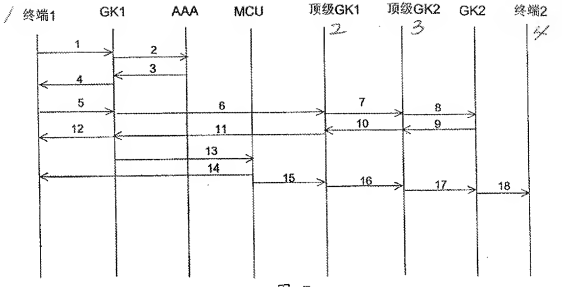
1—Terminal 1

Figure 5



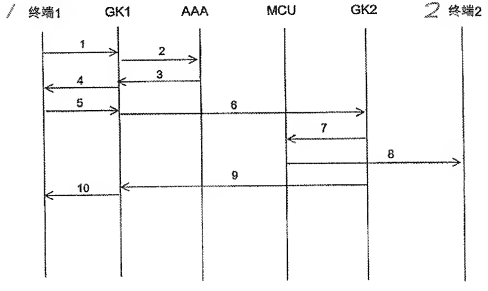
1—Terminal 1; 2—Terminal 2

Figure 6



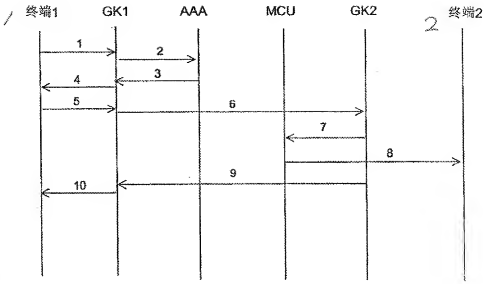
1—Terminal 1; 2—Top GK1; 3—Top GK2; 4—Terminal 2

Figure 7



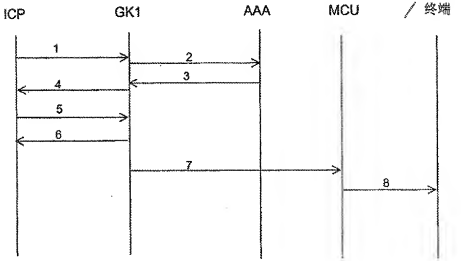
1—Terminal 1; 2—Terminal 2

Figure 8



1—Terminal 1; 2—Terminal 2

Figure 9



1—Terminal

Figure 10